The Role of the Project Life Cycle (Life Span) in Project Management

A literature review by R. Max Wideman

(Updated February, 2004.)

Introduction

Patel and Morris have stated that

> "The life cycle is the only thing that uniquely distinguishes projects from non-projects".[1]

If that is true, then it would be valuable to examine just what role the so-called project life cycle plays in the conduct of project management. And, moreover, has this changed over the years as we improve our understanding of the complexities of project management.

So, what is the project life cycle? According to the same source

> "The sequence of phases through which the project will evolve. It is absolutely fundamental to the management of projects . . . It will significantly affect how the project is structured. The basic life cycle follows a common generic sequence: Opportunity, Design & Development, Production, Hand-over, and Post-Project Evaluation. The exact wording varies between industries and organizations. There should be evaluation and approval points between phases often termed 'gates'."[2]

How does that make it different from normal operational corporate endeavors? For that we must understand the definition of project. According to Richard E. Westney: "A project can be defined as the work required to take an opportunity and convert it into an asset."[3] In this sense, both the opportunity and asset are singular, with the implied use being for generating benefit – rather than consumed as a resource in normal operational activity over a prolonged period.

The Patel and Morris definition refers to "gates" between phases. Another name for "gates" is milestones, albeit "major milestones". Since scheduling also involves milestones, how is a project life cycle different from a project schedule? Once again there are various definitions, but essentially a project schedule is a display of "the planned dates for performing activities and the planned dates for meeting milestones."[4] The two are clearly very similar, but the essence of a project schedule is to provide specific activity dates while the project life cycle is in the nature of a strategic plan displaying sequence only.

And, while we are at it, what about that word "cycle"? It is true that cycle implies a period of time for a series of events, but the essential feature of a cycle is that it is repeated. This is not the case with a project, except in certain special cases such as linear projects like pipe laying, road building or high-rise construction, where a sequence of activities may be repeated at the working level during the execution phase. So the term appears to be inappropriate. Therefore, a better term would be "project life span".

Historical perspective

The concept of a "sequence of phases", or sequential periods of time for an undertaking is not a new one.

More than 2,500 years ago, the famous Chinese philosopher, Confucius, expressed this sentiment. "In all things, success depends upon previous preparation – and without such preparation there is sure to be failure." In modern parlance, this elementary observation translates into a simple two-step sequence: "Plan before doing", or the more popular exhortation "Plan Your Work, Work Your Plan!" So, here we have the genesis of the project life span.

One of the earliest references to a planned sequence that I can find is from the Institution of Civil Engineers (ICE) Post War National Development Report published in 1944.[5] In this report, the ICE recognized the need for a systematic approach to planning public works projects by pointing out that:

> "In order to carry out work efficiently, it is essential that a scheme of operations be first decided by those directly responsible for the execution … With such planning the work can be broken down into a series of operations and an orderly sequence or programme of execution evolved … Without a Programme the execution can only be haphazard and disorderly … The drawing up of a Programme at the beginning of the work does not mean, of course, that it is drawn up once and for all and cannot be changed. The exact reverse is the case …"

It is true that this might be interpreted as a reference to scheduling, known as programming in the UK. However, the reference to "scheme of operations" also permits a strategic intent, especially as scheduling, per se, did not come into its own until some years later.

In fact, according to Wilemon:

> "In the late 1950s, for example, considerable attention was focused on the Navy's use of project management in the development of the Polaris program. A few years later, NASA received the attention of practitioners and academicians for the advances it made in project management in administering the large, complex Apollo program."[6]

Actually, the "attention of practitioners and academicians" was focused mainly on the critical path method (CPM) for scheduling a complex set of project activities, especially with the emergence of mainframe computer capabilities.

Early project management focused texts

One of the earliest comprehensive texts on project management is Archibald's book: Managing High-Technology Programs and Projects (1976). In it, Archibald explains the project life span as follows:

> The project life cycle has identifiable start and end points, which can be associated with a time scale. A project passes through several distinct phases as it matures, as illustrated in Figure 2.1. The life cycle includes all phases from point of inception to final termination of the project. The interfaces between phases are rarely clearly separated, except in cases where proposal acceptance of formal authorization to proceed separates the two phases."[7]

Figure 2.1 is actually a table, which lists five types of project and shows the typical activities for each in each of six phases. The six phases are sequentially: 1 - Concept; 2 - Definition; 3 - Design; 4 - Development; 5 - Application; and 6 - Post Completion.

Archibald goes on to say

"***The Project Character Changes in Each Life-Cycle Phase***

In each succeeding phase of a project new and different intermediate products (results) are created, with the product of one phase forming a major input to the next phase. Figure 2.2 illustrates the overall process. The rate of expenditure of resources changes, usually increasing with succeeding phases until a rapid decrease at completion. The people, skills, organizations, and other resources involved in the project change in each life cycle phase. Major review of the entire project occurs at the end of each phase, resulting in authorization to proceed with the next phase, cancellation of the project, or repetition of a previous phase."[8]

Archibald's Figure 2.2 is shown in Figure 1 below.

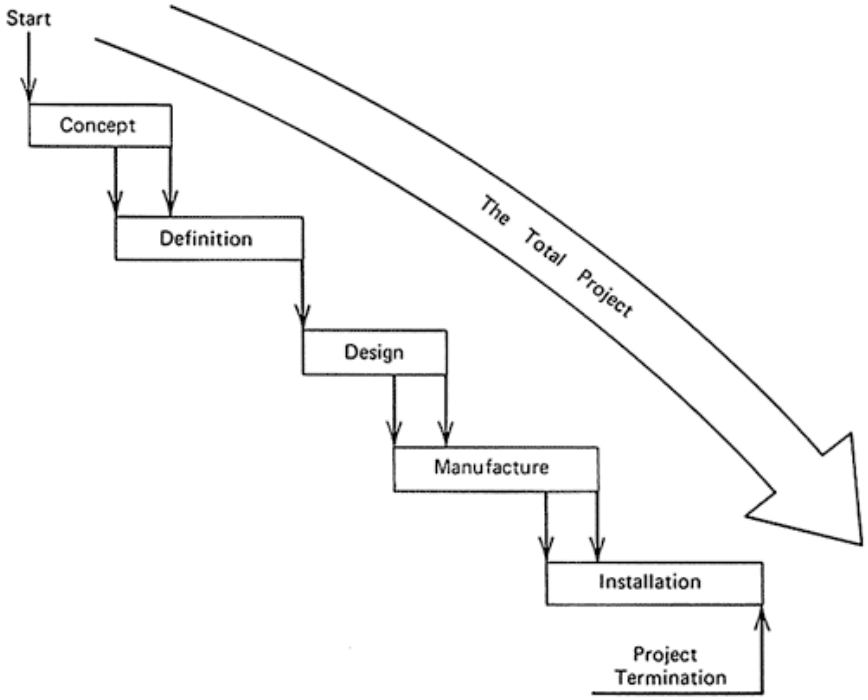

Figure 1: Archibald's Project Life Span

The Project Management Institute ("PMI"), a US based not-for-profit organization dedicated to project management was launched in Pennsylvania in 1969. Its first formal textbook was "The Implementation of Project Management" edited by Dr. Linn Stuckenbruck (1981). In it, Stuckenbruck describes the project life cycle as follows

"***The Project Life Cycle***

A project consists of sequential phases as shown in Figure 1-1. These phases are extremely useful in planning a project since they provide a framework for budgeting, manpower and resource allocation, and for scheduling project milestones and project reviews. The method of division of a project into phases may differ somewhat from industry to industry, and from product to product, but the phases shown in the Figure are basic."[9]

Stuckenbruck's Figure 1-1 is shown in Figure 2.

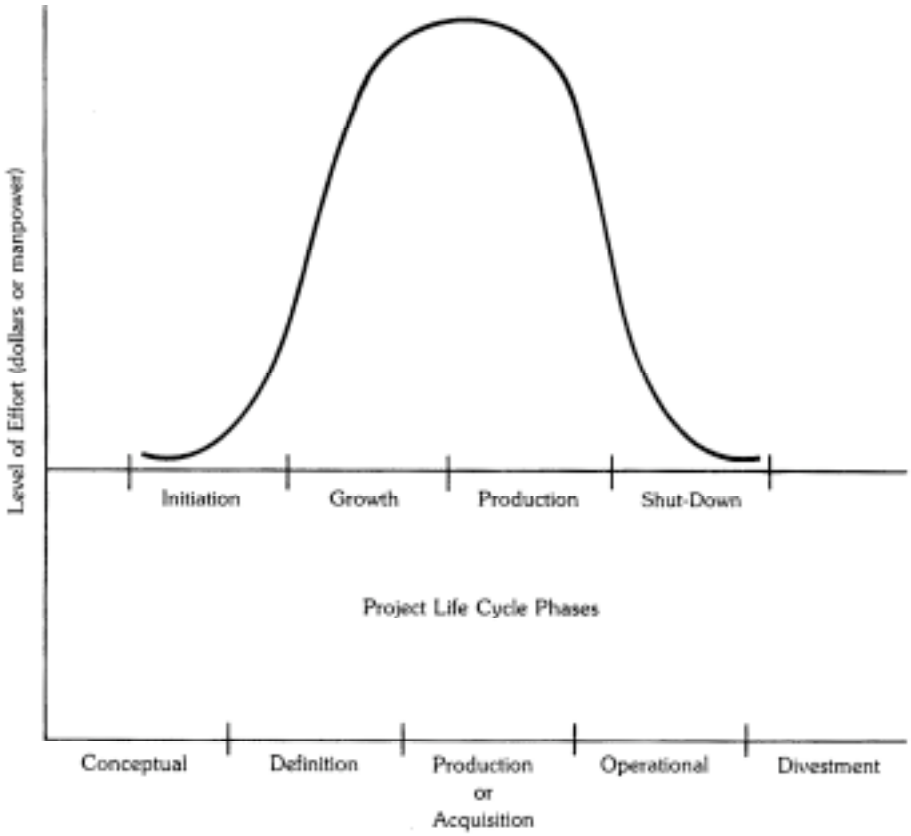

Figure 2: Stuckenbruck's government system life span

Stuckenbruck also tabulates what must be done in each phase by both top management and, as the project matures, by the project manager as shown in Table 1

Concept or Initiation	**Growth or Organization**	**Production or Operational**	**Shut-down**
Management decides that a project is needed. Management establishes goals and estimates of resources needed. Management "sells" the organization on the need for project management. Management makes key appointments.	Organizational approach defined. Project plan and schedule for operational phase defined. Project objectives, tasks (WBS), and resources defined. Project team build-up.	The major work of the project accomplished (i.e., design, development, construction, production, testing, site activation, etc.).	Project terminated. Manpower, resources, and commitments transferred to other organizations.

Table 1: Stuckenbruck's project phase actions

In this table we see clear signs of the evolutionary nature of a project and the purpose of establishing a project life span model. Stuckenbruck then establishes a second purpose by observing

> "This book is primarily concerned with the actions that take place during implementation of a project, which is a combination of the concept or initiation phase and the growth or organization phase. It is often useful to divide the project into phases as shown in Figure 1-2. This scheme of phases fits projects such as construction, and by plotting the phases versus total effort, a very clear picture can be obtained as to where the money goes."

Stuckenbruck's Figure 1-2 is shown in Figure 3.

Given the different interpretations of "implementation" we may question Stuckenbruck's use of this word. Is it the "execution phase", or is it the launching of the entire project? The contents of Table 1 suggest the latter. While on the subject of word meanings, program management and project management were often considered back then to be one and the same, as Stuckenbruck states "For the purposes of this book, the words *project* and *program* are considered to be synonymous."[10]

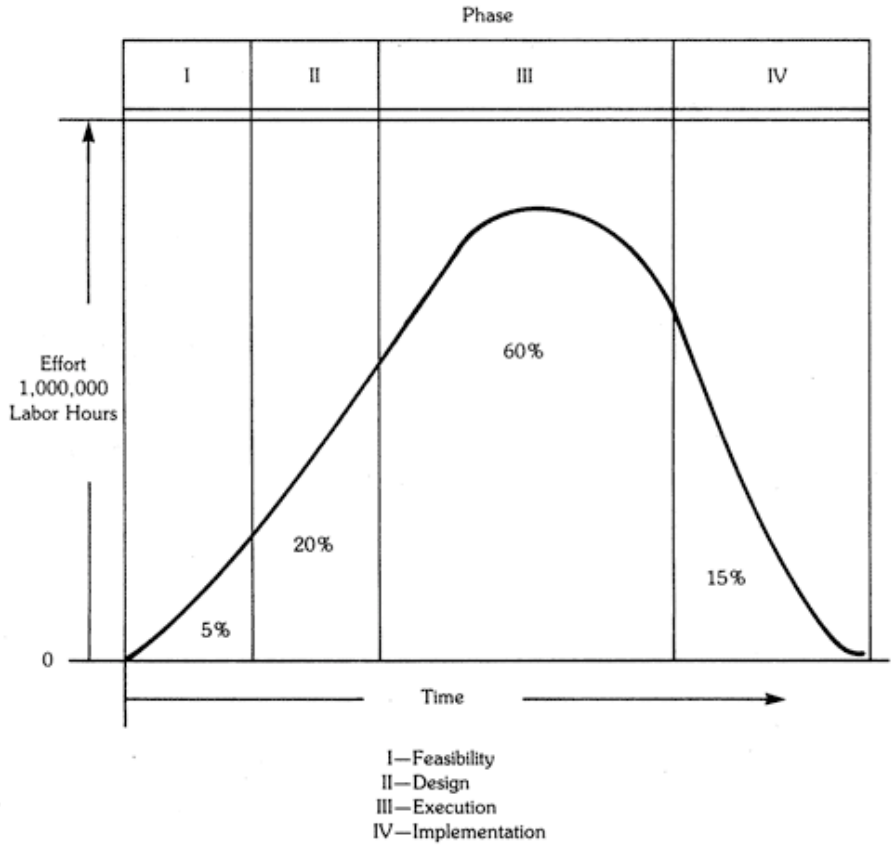

Figure 3: Stuckenbruck's effort-loaded life span

PMI followed this publication with a series of monographs or mini handbooks. One, by Cavendish and Martin, described the relationship between contracting and the project life span, that is, the life span from a general contractor's perspective. The authors point out that for the contractor, the project starts with contract award and hence coincides with the implementation phase. This is an important point because many diehard project people, i.e. those from the contracting fraternity, do not consider that there is a "real" project to manage until it exists under a contract. Cavendish and Martin's project life span is

shown in Figure 4 (1982).[11]

Figure 4: Cavendish and Martin's contract project life span

For the record, in a text that was little recognized at the time, this author attempted to distinguished between the corporate business life cycle, the facility/product life cycle and the project life cycle. Figure 5 shows the graphic that accompanied the descriptive text in PMI's first Project Management Body of Knowledge publication (1987).[12] This is perhaps the first formal recognition that projects always exist in an encompassing "environment", be it the government, private or non-profit sectors. However, Webster later picked up this idea in The Handbook of Project Management (1993) as shown in Figure 6.[13]

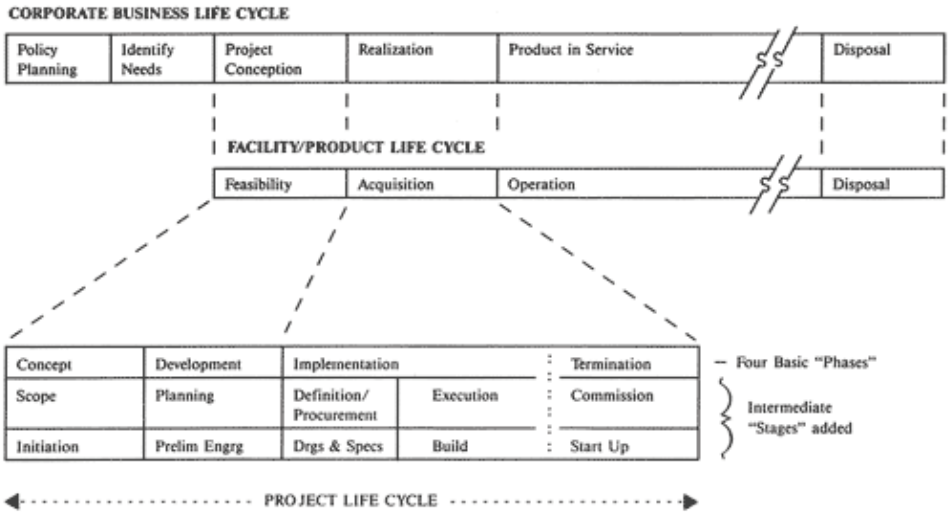

Figure 5: Wideman's corporate business, facility/product and project life spans compared

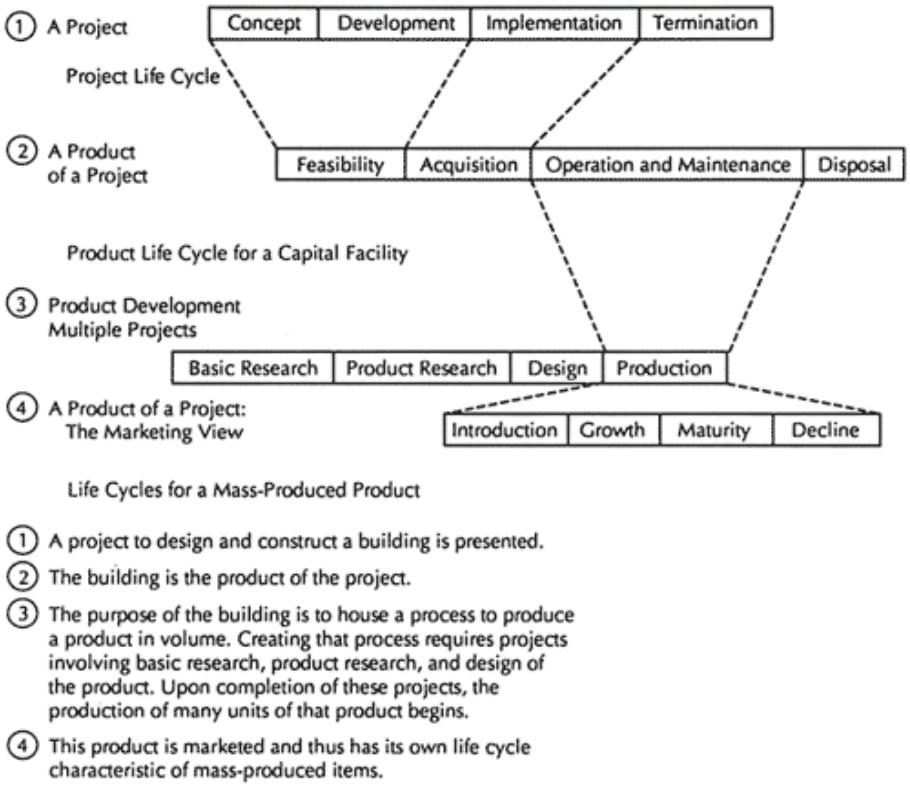

Figure 6: Webster's comparison of project and product life spans

Project life spans, late 1980s

During the '80s, the documenting of project management as a recognizable discipline proceeded apace largely inspired by the influence of the US Institute and the Internet (now renamed International Project Management Association or IPMA) in Europe. For example, Patzak, in Dimensions of Project Management, an IPMA book published in honor of Roland W. Gutsch, the founder of IPMA upon his 65th birthday, discusses the systems approach to project planning (1990). He wrote

> "The starting point for the analysis of the phenomenon PROJECT is to look at a process – the process of transferring an initial state I [Input, or problem] into a desired final state O [Output or problem solution]. In state O all more or less intended outcomes of the process 'project execution' are available having been produced during the whole process. These outputs are concrete (products, organizations, etc.) or abstract (plans, knowledge, experiences, emotional states, etc.) or both. They may be distinguished into
>
> 1. Outputs during the process (e.g. satisfaction of personnel, gain of experience)
> 2. Outputs at the end of the process (final products, state of knowledge)
>
> So, it is obvious that the total process output is much more than the product that is the object to be produced in the project under consideration. Management has to be concerned with all dimensions of process output."
>
> "The problem solving process – the project execution – shows a typical cycle of project life, which is structured into the following pattern of phases:
>
> 1. Objectives Definition Phase (what is to be accomplished?)
> 2. Design Phase (what/how to do it)

3. Realization Phase (doing it)
4. Implementation Phase (hand-over of it)

These phases can be observed in any problem solving process, they do not change with different project definitions."[14]

Interestingly, Patzak goes on to observe that in every phase there is both a management function as well as an execution function and describes the difference in some detail. These observations are important because they introduce the idea of system processing and an acknowledgement of outputs other than those stemming directly from the objective of the project, especially those associated with the people working on the project.

The US influence during this period was reflected in such books as Kerzner's epic 980-page book Project Management: A Systems Approach to Planning, Scheduling, and Controlling (1989) and Cleland's book Project Management: Strategic Design and Implementation (1990). Kerzner discusses systems theory and concepts at some length but along the way draws a clear distinction between the project life span and the product life span. Figure 7 depicts his product life span resulting from research and development.[15] The distinction between project and product life spans is important because a number of present-day writers either make no distinction or define the former in terms of the latter.

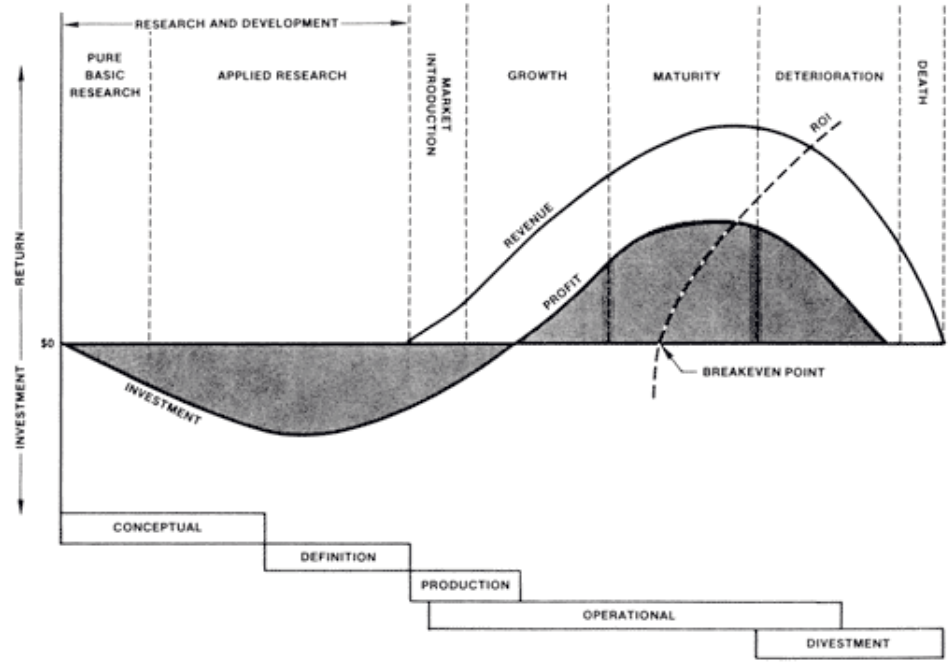

Figure 7: Kerzner's R&D product life cycle

This confusion appears to extend to the Cleland book's chapter on The Project Management Process, which discusses the various phases of the project life cycle in some depth. But the reader may be forgiven for any misunderstanding arising from the apparent ambivalence displayed in the text. The section on project life cycles quotes a number of sources, starting out with one that consists of twelve phases beginning with 'Concept' and ending with 'Production/Maintenance'.[16] The project/product life cycle issue aside, this sequential list reads more like an outline for a Gantt (bar) chart schedule. However, another "Generic project life cycle" quoted encompasses the phases "Conceptual; Definition;

Production; Operational; and Divestment".[17] True, the author notes that different industries use different terminology, and a closer reading of the text makes it clear that the term "Divestment" does not mean disposal of the product at the end of its useful life but rather the transfer of the product at the end of the project's useful life! Still, there can be no doubt that Belanger is confusing product with project life cycle as late as 1997 when he describes the life cycle phases of a construction project as "General Concept; Definition; Detailed Planning; Development and Construction; *Implementation and Operation; Closeout or Retirement*"[18] (emphasis added.)

About his generic project life cycle, Cleland makes an important point

> "Between the various phases are decision points, at which an explicit decision is made concerning whether the next phase should be undertaken, its timing, etc."[19]

This idea represents an important development for two reasons:

1. It introduces the idea of strategic high-level decision points (also known as Executive Control Points, Gates or Gating) at which a decision is taken whether or not to *continue*, and
2. It is distinguished from those earlier texts that emphasize that such phases may, and frequently do, overlap.

This idea is reinforced by Youker in a keynote paper presented at INTERNET 88. In the address he stated in part:

> "The development cycle for World Bank projects . . . defines six sequential steps: identification, preparation, appraisal, negotiations, implementation and supervision and expost evaluation. Other organizations use slightly different terms but most think of the process as a cycle. In reality, even though one can learn from experience, one can never return to the past. So the cycle is really a spiral, circling through the required steps but always moving on to new projects. The cycle consists of a series of steps separated by decision points. The process moves toward implementation and start-up of operations. Evaluation is an ex-post look to seek if the objectives were accomplished and if they were the right objectives."[20]

Youker's illustration is shown in Figure 7a.

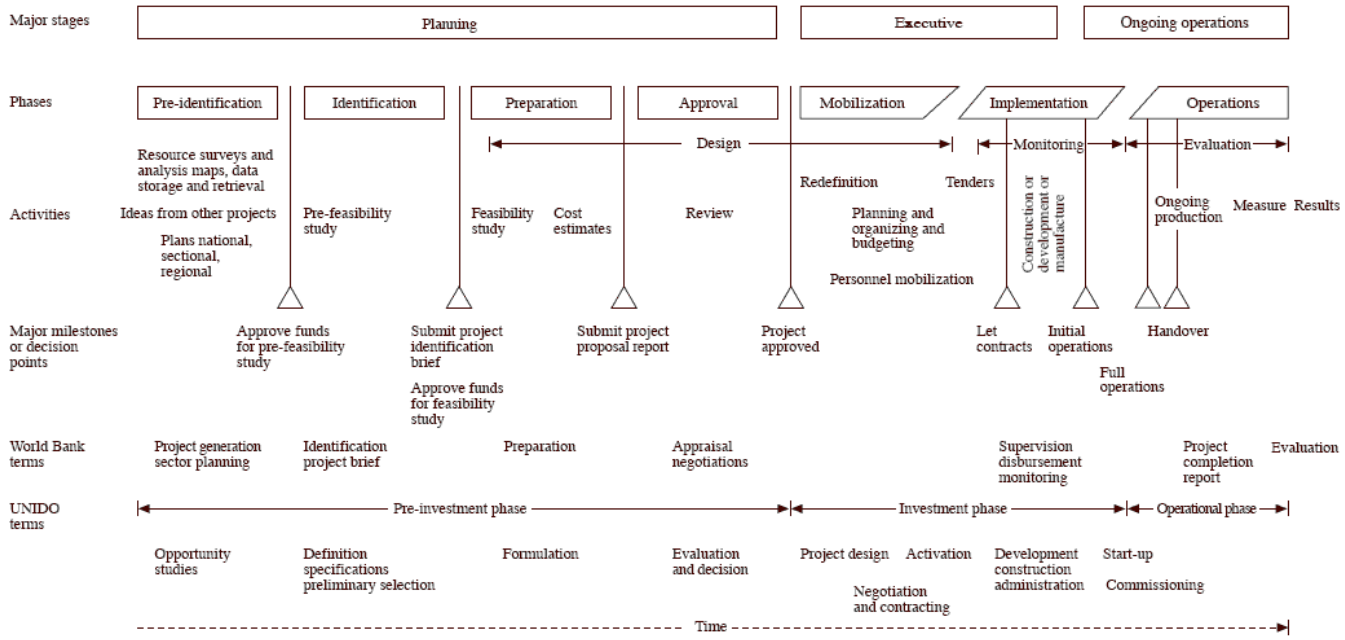

Figure 7a: Youker's World Bank investment project life span

In passing, a number of people had difficulty in relating the "generic" project life span with a "practical" life span such as construction. The author's Figure 8, (circa 1987) not only showed the connection but also indicated the general proportionate time of each phase as a percentage of the construction time, based on building project data collected in the 1970s.[21]

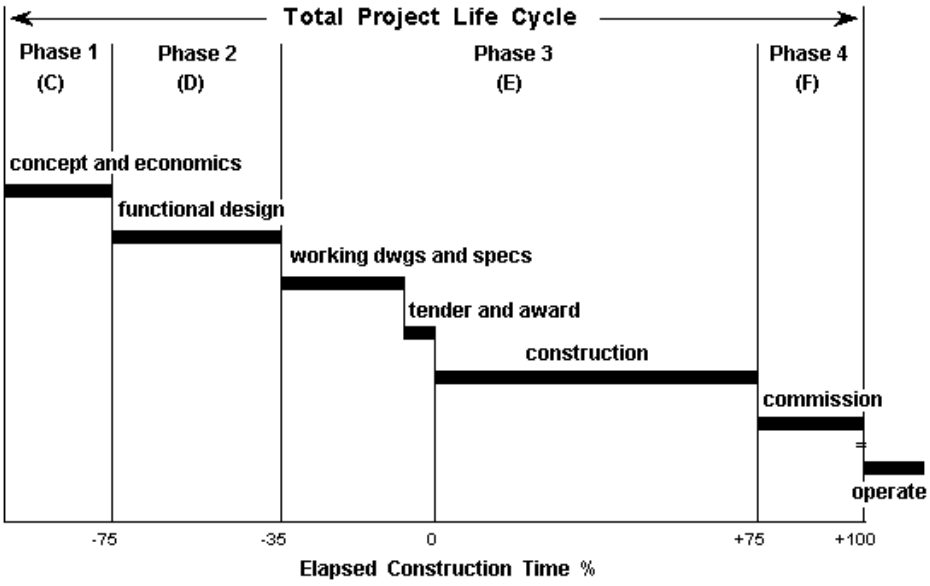

Figure 8: Wideman's construction bar chart related to the generic project life span

The question of responsibility was also an issue. Figure 9 shows the project delivery system developed by Public Works Canada (1989). [22]

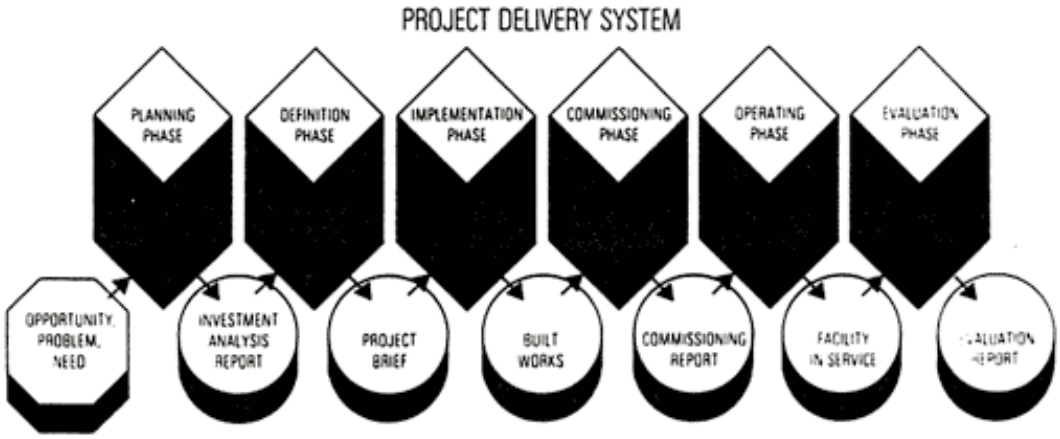

Figure 9: Public Works Canada's facility life span

This diagram emphasizes the deliverables expected from each phase, but the text accompanying the diagram high lights both focused responsibility and an expectation that this responsibility will change from one individual to another during the course of the project.

> "During the first, third and fifth phases, a single key player has direct responsibility. During the other phases, this responsibility shifts to the key player responsibility for the next phase. The second, fourth and sixth phases do not usually exist independently but form part of the adjoining phases. They are shown separately to emphasize the overlapping responsibilities of the key players during transition from one phase to another. A smooth transition between phases allows orderly project delivery."

Project life spans in the 1990s

In late 1991, Warren Allen consolidated the general view of the project life span in a paper titled "The Universe of Project Management: A Comprehensive Project Management Classification Structure (PCMS) to Update and Expand the Dimensions of PMI's PMBOK". The paper arose out of a discussion amongst a group of interested PMI members prior to the annual seminar/symposium. Allen's PCMS model related the nine or more "Level 1" project management functions with the generic project life cycle. As Allen describes it

> "[The] project life-cycle (Time) dimension defines the principle 'Major Management Phases' of virtually any type of project and acknowledges that project management functions and their application often change as the project moves through the various phases of its life-cycle." [23]

Unfortunately, the Project Management Institute subsequently declined the paper for publication, failing to see its value, and it appears that the author lost interest. Allen's project life span is shown in Figure 10.

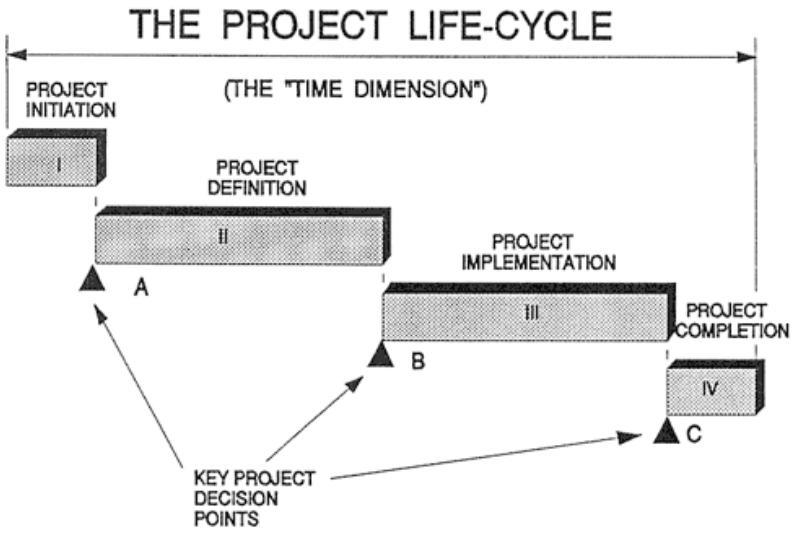

Figure 10: Allen's generic project life span

One might be forgiven for thinking that by this time just about everything that could be said about project life spans had already been said about them. That might have been true but for two major events in the '90s. The first was the rapid rise of the idea of managing by projects in the emerging high-project volume software development industry. Software development, like R&D, is not so amenable to the deterministic planning flowing from the idea of a well-established generic project life span. On the contrary, the production people (i.e. programmers) in this industry seemed to have strongly eschewed any suggestion of the control that an established life cycle implies. That is, until the arrival of the "Year 2000" (Y2K) legacy software upgrade panic.

The second event seems to be the publication in 1996 of the Project Management Institute's Guide to the Project Management Body of Knowledge ("PMBOK"). This publication was a complete rewrite of the 1987 version, which had attempted to identify those areas of knowledge within the purview of a project management discipline, or profession, as some prefer to call it. The Guide, on the other hand, set out to describe only the subset of the PMBOK that is generally accepted.[24] As a part of this rewrite, a section was devoted to project phases and the project life cycle with a number of examples displayed. Disappointingly, the sample generic life cycle offered was denuded to the point of illustrating only the beginning and end of a project. It appears that the author(s) of this section had not done their homework in reviewing even PMI's own official publications. Worse yet, the same illustration was repeated in the 2000 Edition update, see Figure 11.[25]

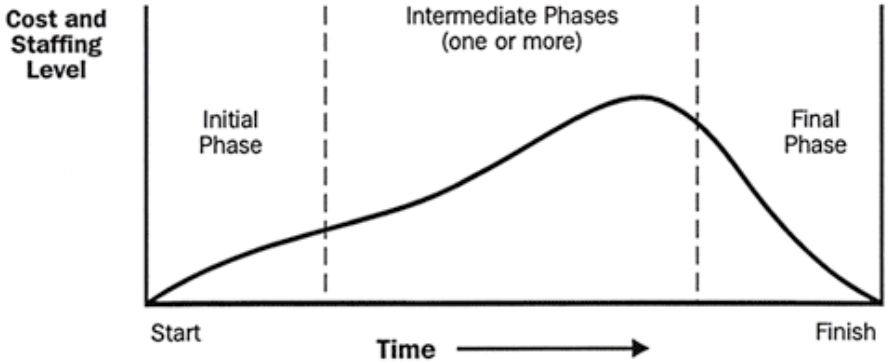

Figure 11: PMI Standard Committee's sample generic project life span

Perhaps the PMI Standards Committee was influenced by a presentation made to an information systems group by Kapur (1995). The paper was titled "The Seven Deadly Sins of Project Management" and Sin Number 5 pointed to the lack of a robust project management process. Kapur proposed a set of six stages in a "Scalable Model" of 33 steps. His illustration is shown in Figure 11a.[26] The red triangles between each stage represent the specific deliverables shown in the boxes immediately below. However, closer study of the Figure shows that the second stage is "Pre-Launch" suggesting that only the third, fourth and fifth stages shown are a part of the formal project life span.

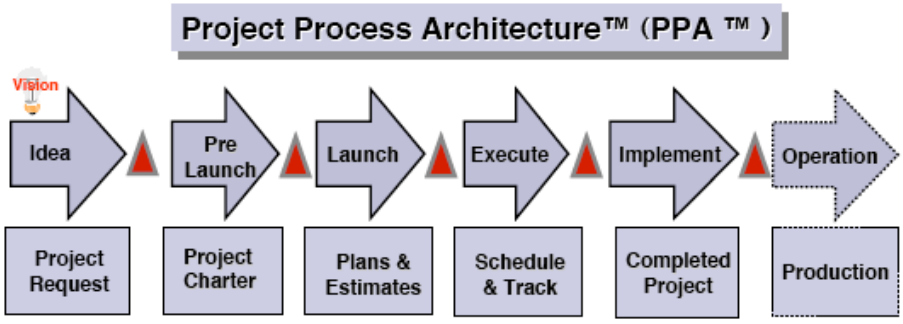

Figure 11a: Kapur's information system project life span

Instead of this limited view, others were expanding their vision of project management. For example, Morris wrote (1998):

> "Too many people see project management as beginning when the project is set up. Yet all the lessons of modern management – and indeed all the lessons of project management history – show that time spent up front in defining needs, exploring options, modeling, testing, and looking at different business benefits is central to producing a successful project. The decisions made at the early definition stages set the strategic framework within which the project will subsequently develop. Get it wrong here, and the project will be wrong for a long time – perhaps forever. Get it right, and you are half way there. (Defining the problem is half the solution; 90 percent of the outcome is defined in the first 10 percent of the project.) This is one of the most crucial areas of project management professional input."[27]

Morris includes a graphic of his project life cycle as shown in Figure 12.

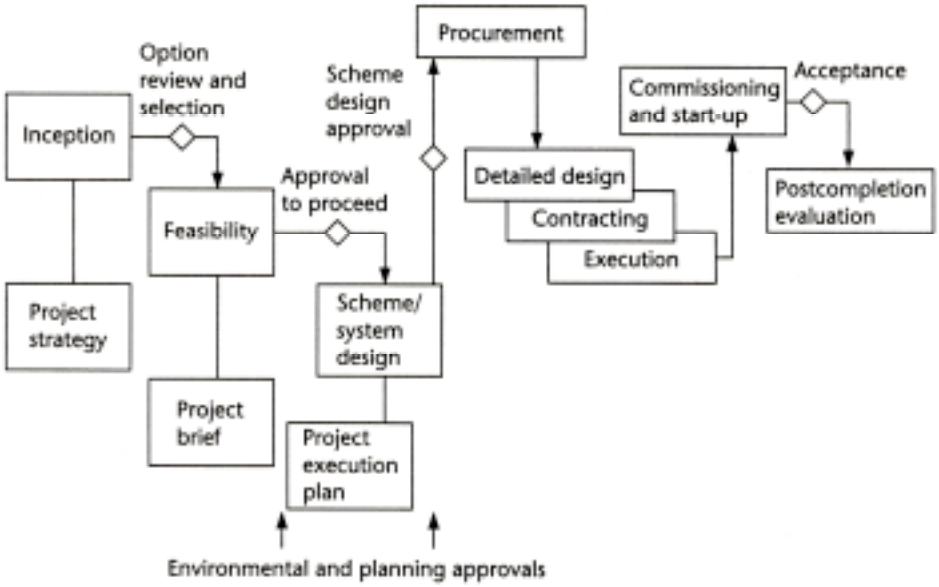

Figure 12: Morris's project life span

In fact, Morris's graphic looks more like a flow diagram with inputs and outputs rather than a time based life span display.

Frame mirrors Morris's view. He wrote (1998)

> "If the traditional four-phase project life cycle is viewed from the customer perspective, we encounter a dramatic revelation. The phases that customers worry most about are the very ones that have been down played in the theory and practice of project management. Customers care most about phases 1 and 4. With respect to phase 1, their concern is: "Did you get my needs and requirements right?" If not, then the planning and implementation activities of phases 1 and 2 are a waste of time. With respect to phase 4, their concern is: "Are you about to hand me a deliverable that meets my needs and is operable and maintainable? If not, then what you have been doing on the project these past few months?" The link between project closeout and the level of customer satisfaction with project effort should be obvious."[28]

The Morris and Frame views are probably reflections of actual steps taken by some companies, such as Dupont and Abitibi, to be more thorough with "front-end" work, especially if their market position depends on capital-intensive projects. Figure 13 shows the introductory graphic to a presentation promoting the idea of "front-end loading" of the project development phases (1996).[29]

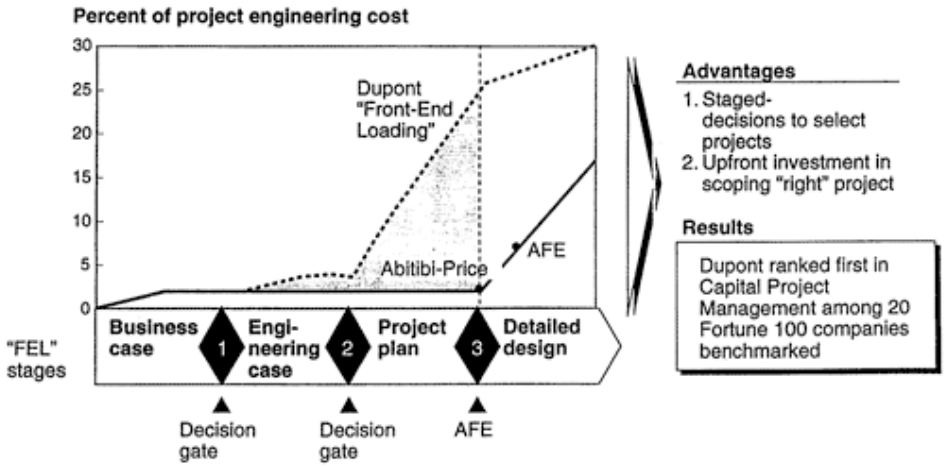

Figure 13: Abitibi's front-end loading of project development

Thoms describes three stages of the project life span in terms of motivation, which brings in the "people" (or human resources) aspect. She says (1998)

> "Getting started
> The goal of the first stage is to get the team and each individual member moving and motivated. Part of the process of motivating the project team is explaining the project, yet many managers fail to tell their team why the project is important.
> . . .
> Project Development
> In the next stage, the day-to-day work on the project proceeds, and the project develops. A project manager who provides an exciting launch for a project needs to keep energy flowing when the team gets bogged down in details and runs into problems.
> . . .
> Wrapping Up the Project
> The final stage of a project can sometimes be the most difficult. Often teams are tired of the work, bored with the technical details, and anxious about the next project. This stage varies with the length of the project and the attention span of each individual."[30]

This author went further and associated different phases of the generic project life span with different project manager personality types as best suited to the management of that particular phase. He wrote (1998)

> "The 'Concept' phase of the four phase high-level project life cycle should start out with the 'Explorer' type; then proceed with a 'Coordinator' type in the 'Development' (definition or planning) phase; move to an assertive 'Driver' type in the 'Execution' phase; and conclude with the 'Administrator' type in the cleanup 'Finishing' phase."[31]

Meantime, the software development industry appeared to be going its own way. The so-called "waterfall" model of the "conventional" software engineering process or workflow, shown in Figure 14, was touted by many but decried by others. This model is technology specific, but its essential difference is that the major activities overlap significantly. However, the real difficulty with this model is software development's essential need to progress iteratively.

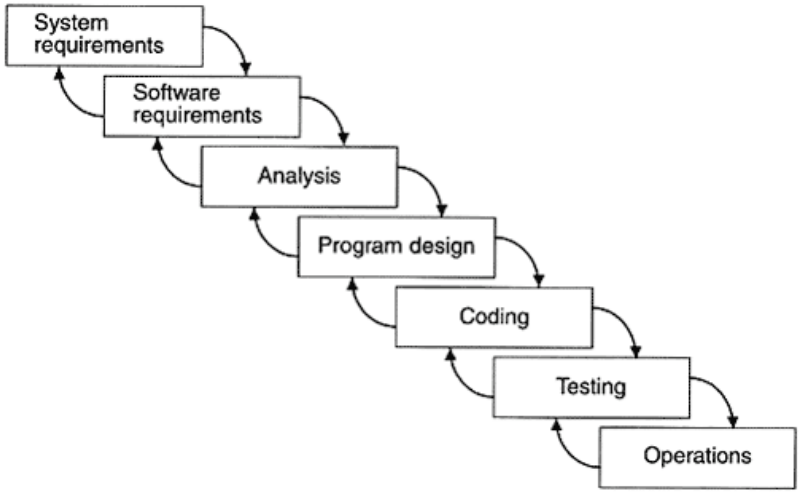

Figure 14: Conventional waterfall model of software development

An early attempt to reflect an iterative strategy was offered by Boehm (1988) in a "spiral" model as shown in Figure 15.[32]

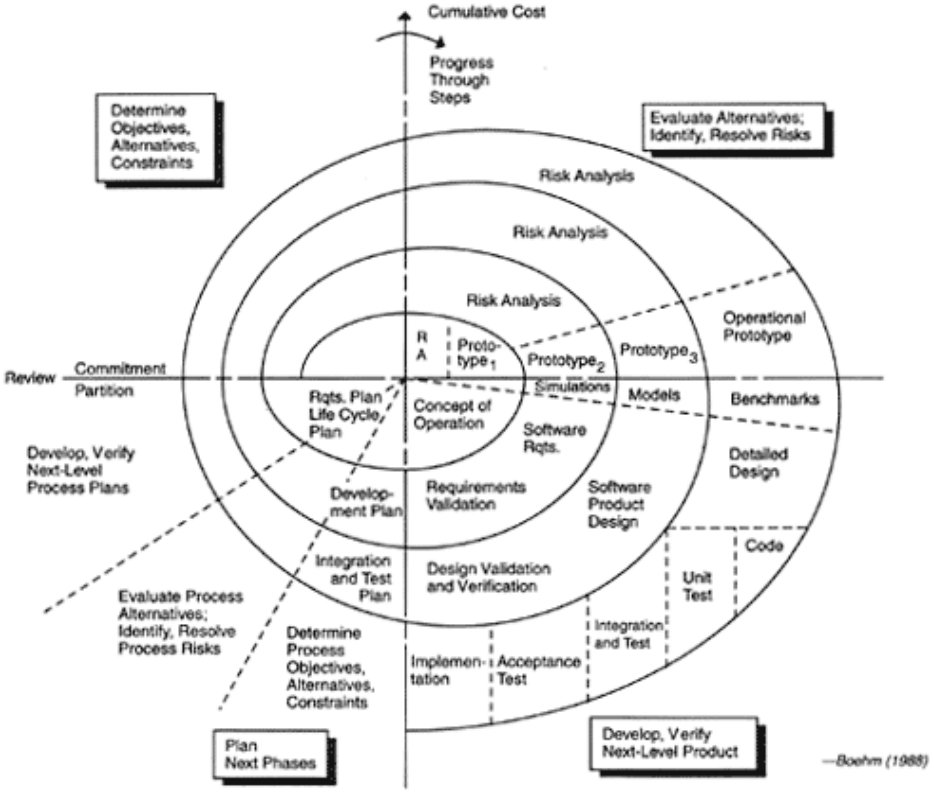

Figure 15: Boehm's spiral model of software development

However, Royce brought some semblance of order by suggesting the relationship between the spiral model and the project life span as shown in Figure 16 (1998).[33]

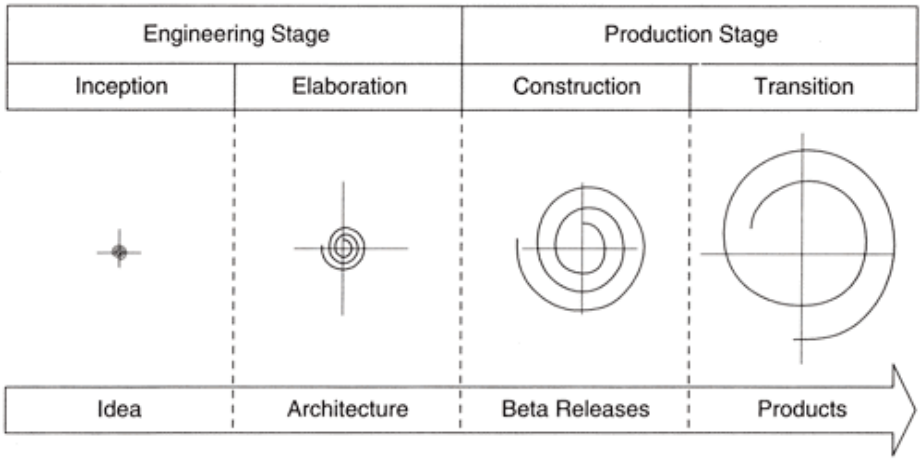

Figure 16: Royce's life span view of the spiral model

Given the explosion of small to medium sized information systems/technology projects, Mochal has developed one of the first discrete project management methodologies dedicated to this market. It is based on Mochal's view of the project life span for software development projects in a process he calls the Project Lifecycle Process™. His five-phase framework is shown in Figure 16a.[34] The accompanying manual details all the project and technical management activities to be considered in an essentially linear process.

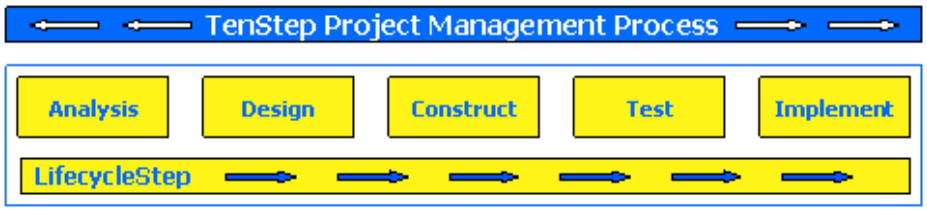

Figure 16a: Mochal's view of software development projects

Whither project life spans in the 2000-decade?

In recent years, the accelerating pace of technological development has led to the need to administer and manage multiple projects to maintain competitive advantage. Whether this is a consequence of, or driver for, even greater focus on the front-end of project life spans is difficult to say. Either way, the focus of project management has moved "upstream" into program management and project portfolio management. This requires senior management's attention not just on one project but multiple projects competing for resources, cash flow and contribution to corporate strategic objectives. This in turn requires closer attention to screening or filtering out potential projects that do not make the grade during the course of the portfolio-program-project life span.

Therefore, Forsberg, Mooz and Cotterman suggest that the project life span has three aspects: Business, Budget and Technical (2000). As they say

> "The *business* aspect contains the necessary business events related to customer management, justifying the project, the overall business management events, and associated contractor and subcontractor management.

. . .

The *budget* aspect depicts the activities and events necessary to fuel the project with funds throughout its project life cycle.

. . .

The budget activities and business management activities are combined with the *technical* aspects to yield the complete project cycle. The technical events are often the most significant force driving the project length and cost, and they're often the most difficult to manage."[35]

But as Archibald observes on the importance of designing and documenting project life-cycle processes

"Designing and documenting project life-cycle processes will:

- Enable all concerned with creating, planning, and executing projects to understand the process to be followed during the life of the project.
- Capture the best experience within the organization so that the life-cycle process can be improved continually and duplicated on future projects.
- Enable all the project roles and responsibilities and the project planning, estimating, scheduling, monitoring, and control methods and tools to be appropriately related to the overall project life-cycle management process.

Unless a well-documented, understandable picture of the life-cycle process for each project category exists, it will be impossible to achieve the full benefits of modern, systematic project management."[36]

Archibald includes a typical gating process as shown in Figure 17.

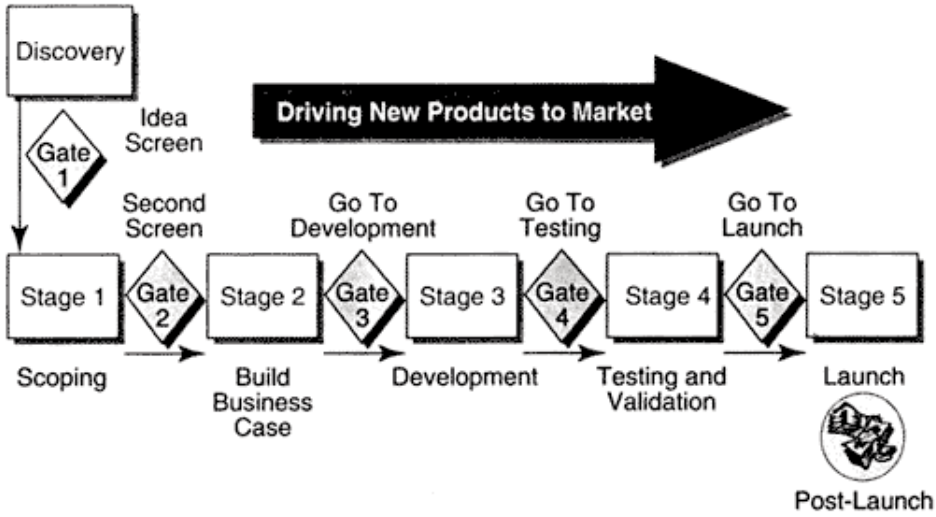

Figure 17: Cooper, Edgbert & Kleinschmidt's Stage-Gate ™ process[37]

Archibald also clarifies the generic project life span with these words

"There is general agreement that these [i.e. the following] broad, generic project phases are

- Concept (initiation, identification, selection)*
- Definition (feasibility, development, demonstration, design prototype,

quantification)
- Execution (implementation, production, and deployment, design/construct/commission, install and test)
- Closeout (termination and post completion evaluation)

However, these phases are so broad and the titles so generic that they are of little value in documenting the life-cycle process so that it can be widely understood, reproduced, and continually improved."[38]
[* Common alternative terms shown in parenthesis]

Archibald suggests that these phases are so broad and the titles so generic that they are of little value in documenting the life cycle process so that it can be widely understood. He goes on to say that what is needed is the definition of perhaps five to ten basic phases for each project category. Fish, in a thoughtful paper "An Improved Project Lifecycle Model"[39] agrees (See http://www.maxwideman.com/guests/plc/intro.htm). Fish takes an in-depth and practical look at the project life span from the perspective of the chemical process industry. He provides a rationale for a "more robust" second or third level model by subdividing each of the "four" generic phases each into two more for a total of eight. Or ten if you include "sanction" and "audit" stages that are beyond the control of the project manager. He also arranges the model into a "Vee" display as shown Figure 18, an arrangement strongly espoused by Forseberg, et al.[40]

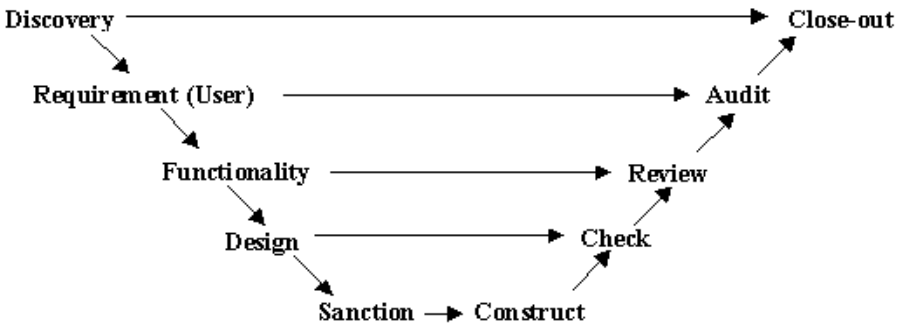

Figure 18: Fish's "Vee" model of the project life span

Summary and conclusions

In reviewing the last three decades, it seems clear that the scope of project management and the underlying concepts of the project life span have evolved considerably. Whether this evolution is the result of a deliberate progression, or due to a gradually improved understanding of the project management phenomenon itself may be open to question. Certainly, today there is a better understanding of the integrative role played by a properly constructed project life span, even if project management associations have failed to fully explain and underscore the importance of this role.

It appears that Patel and Morris's 1999 description of the project life cycle (span) is an accurate one, namely

> "The sequence of phases through which the project will evolve [and] will significantly affect how the project is structured . . . There should be evaluation and approval points between phases often termed 'gates'."[41]

Thus a structured project life span plays a key role in the control strategy for the evolution of a project. Unlike schedule bar charts and flow diagrams, the project life span phases represent significant changes as the project progresses through succeeding levels of maturity. These include changes in: progressive levels of detail in management decision-making, required management style, and required management skill sets. Control points, constituting major milestones at which specific deliverables are expected, segregate these high-level strategic phases. Moreover, these points in time are treated as "gates". The idea of gates implies that the project does not proceed beyond them unless and until the required phase deliverable has been carefully reviewed and found satisfactory.

One might liken this progression as somewhat akin to the young student passing a succession of final exams as he or she climbs up the educational ladder to full-grown capability. Each subsequent step in the educational program requires passing the criteria for competence in the previous level.

What also seems to be clear, however, is that there has been considerable controversy over when a project actually starts and, surprisingly, when it finishes. Moreover, this is a controversy, or lack of understanding, that continues to this day. This misunderstanding seems partly due to some people viewing a project as a "process" while others use the word as a substitute for the word "product".

For example, Archibald lists the generic project life cycle as

- Concept (initiation, identification, selection)
- Definition (feasibility, development, demonstration, design prototype, quantification)
- Execution (implementation, production, and deployment, design/construct/commission, install and test)
- Closeout (termination and post completion evaluation)

The labels sound good, but I am not convinced that there is general agreement on their meaning. Indeed, I believe that "deployment, design/construct/commission, install and test" are sufficiently different from the product production work that it constitutes a different and final phase to the project. Along with "Closeout" I prefer to think of the fourth phase in terms of "Transfer of care, custody and control" of the product to the eventual owners/users.

Archibald suggested that these phases are so broad and the titles so generic that they are of little value in documenting the life cycle process so that it can be widely understood. He went on to say that what is needed is the definition of perhaps five to ten basic phases for each project category. That may well be so, but then those project life spans are no longer "generic", there is as yet no "general agreement" on project categorization or a project classification scheme and, I suggest, if we cannot understand the basic generic project life span, how can we expect to reach a general understanding of anything more detailed? Indeed, the Strategy Principle, Principle #4 in my paper First Principles of Project Management (see http://www.maxwideman.com/papers/principles/principles.htm) attempted a simple explanation of such a simple concept.

However, writing from the perspective of the chemical process industry, Fish agrees with Archibald that a more detailed and "robust" model would be more useful, one having eight phases at the next level of detail. Clearly, there is more work still to be done and no doubt the larger and more complex the project,

the more gated phases that are desirable. Nevertheless, what does appear to be evident is that *four* phases, as listed for the generic model, are a *minimum* for any project to be *fully* successful.

On the positive side, much improved recognition is now given to the importance of project justification long before execution of actual product production work. Recognition is also being given to the importance of the transfer of the "product" into the care, custody and control of the users. This latter area of the project life span still requires more attention, but it is a reflection of the reality that all projects exist in an "environment", whether public, private or non-profit, and a realization that this environment also needs to be managed. That is to say, the management of a project needs to extend beyond the internal processes to what is happening outside the project.

A further development over the decades is the change in the nature of projects encompassed. This has moved the focus of project management literature from managing large relatively limited capital construction or technology projects to managing portfolios of short-run system and service-oriented projects. This is often accompanied by an increase in the number of stakeholders involved. It is evident from all of this that one size does not fit all but rather requires a degree of flexibility. However, just how much is still a matter of on-going debate.

The issue, as always, is one of strategy: "How much control? Who should have it? and When?"

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